

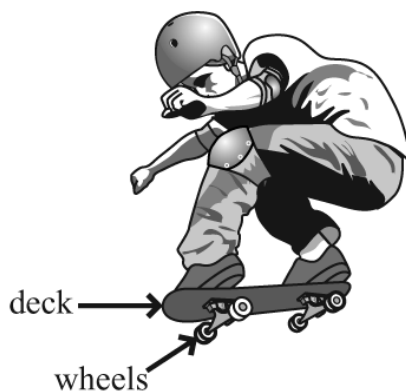


**Science Grade 5  
Scoring Guide for  
Released Item #35  
Forces on Skateboard  
Fall 2005**



**Prompt**

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Chris has joined a skateboarding team and purchased a new skateboard. The team captain tells Chris that being a good skateboarder means understanding and using physical science. Use your knowledge of physical science to answer the following questions.

**ANSWER THE FOLLOWING CONSTRUCTED-RESPONSE ITEM IN YOUR ANSWER FOLDER.**

**Constructed-Response**  
**(3 points)**

- Identify two forces that act on the skateboard as it moves down the ramp.
- Explain how these forces affect the motion of the skateboard.

**NOTHING WRITTEN IN THIS TEST BOOKLET WILL BE SCORED.**

## Science Rubric for the Forces on Skateboard

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### Acceptable Responses:

#### Forces

- Friction
- Gravity
- Push/pull

#### Explanations

- Friction helps the wheels maneuver.
- Friction between Chris' foot and the ramp helps start the motion.
- Friction between the wheels of the board and the ramp acts to slow the motion down.
- Gravity acts to pull the board down the ramp.
- Gravity helps the skateboard go faster.

### Scoring Guide:

- 3 points** The student identifies two forces that act on the skateboard and explains how both forces affect the motion of the skateboard.
- 2 points** The student identifies two forces that act on the skateboard one of which is explained.  
**OR**  
The student identifies one force that acts on the skateboard and explains its effect on the motion of the skateboard.
- 1 point** The student identifies two forces that act on the skateboard.
- 0 points** The student fails to provide any acceptable information.  
**OR**  
The student identifies one force that acts on the skateboard.  
**OR**  
The student explains one force without identifying the force.

#### Condition codes for unratable papers (zeroes):

- A – Off Topic  
B – Written in a Language other than English or Illegible  
C – Blank or Refusal to Respond

## Anchor Paper 1 – Score Point 3

③ AI

3 points

The motion of a skateboard going down the ramps. Two forces that act on the skateboard as it goes down the ramps are gravity and friction. Gravity affects the skateboard as it goes down the ramps by pulling it down this makes it go faster. Friction affects the skateboard by slowing it down.

Anchor Paper 1  
Score Point 3

The student identifies two forces that act on the skateboard (*gravity and friction*), explains how the force of gravity affects the motion of the skateboard (*Gravity affects the skateboard as it goes down the ramp by pulling it down this makes it go faster*) and explains how the force of friction affects the motion of the skateboard (*affects the skateboard by slowing it down*).

## Anchor Paper 2 – Score Point 3

(3) A2

3 points When Chris moves down the ramp the force of gravity acts on the skateboard. Gravity makes Chris move down the ramp faster.

another force that acts on the skateboard is friction. Friction makes the skateboard move down the ramp slower.

Anchor Paper 2  
Score Point 3

The student identifies two forces that act on the skateboard (*force of gravity, friction*), explains how the force of gravity affects the motion of the skateboard (*Gravity makes Chris move down the ramp faster*) and explains how the force of friction affects the motion of the skateboard (*Friction makes the skateboard move down the ramp slower*).

## Anchor Paper 3 – Score Point 3

(3) A3

3 points

One force that acts on the skateboard as it moves down is gravity. Another force that acts on the skateboard as it moves down is friction. Gravity pulls Chris down the ramp when he begins his downward motion. Friction helps him get started because he pushes his foot off the ramp to get started.

Anchor Paper 3  
Score Point 3

The student identifies two forces that act on the skateboard (*one force is gravity....another force...is friction*), explains how the force of gravity affects the motion of the skateboard (*Gravity pulls Chris down the ramp*) and how the force of friction affects the motion of the skateboard (*Friction helps him get started because he pushes his foot off the ramp to get started*).

## Anchor Paper 4 – Score Point 3

(3) A4

3 points

Two forces that act on a skateboard are gravity & friction. Gravity helps keep the skateboard on the ramp. Friction helps slow down or stop the skateboard. Gravity

Anchor Paper 4  
Score Point 3

The student identifies two forces that act on the skateboard (*gravity + friction*), explains how gravity affects the motion of the skateboard (*helps keep the skateboard on the ramp*) and how the force of friction affects the motion of the skateboard (*Friction helps slow down or stop the skateboard*).

② A5

3 points

3 points friction and gravity, gravity pulls the skateboard back down, and friction lets it slide faster.

The student identifies two forces that act on the skateboard (*friction and gravity*) and explains how the force of gravity affects the motion of the skateboard (*pulls the skateboard back down*). The statement “*friction lets it slide faster*” is an incorrect explanation of how friction would affect the speed of the skateboard as it moves down the ramp.



## Anchor Paper 6 – Score Point 2

② A6

3 points — Two forces that act on the skateboard are gravity & Friction. Gravity is one because it pulls the skateboard down the ramp. Friction because the skateboard and the ramp rub together when the skateboard goes down the ramp.

Anchor Paper 6  
Score Point 2

The student identifies two forces that act on the skateboard (*gravity & Friction*). The response explains how the force of gravity affects the motion of the skateboard (*Gravity...pulls the skateboard down the ramp*) and attempts to explain how the force of friction affects the motion of the skateboard (*skateboard and the ramp rub together when the skateboard goes down the ramp*). The rubbing of the skateboard and ramp does cause friction, but does not sufficiently explain how this friction affects the motion of the skateboard as it goes down the ramp.

## Anchor Paper 7 – Score Point 2

② AM 2

3 points

There are a few forces that act on the the skateboard as Chris rides down the ramp on it. One of which is gravity. It is pulling the board and Chris downward rather than floating off into space. Another is friction. The shoes of Chris are staying in place because of the griptape.

Anchor Paper 7  
Score Point 2

The student identifies two forces that act on the skateboard (*gravity, friction*). The response explains how the force of gravity affects the motion of the skateboard (*pulling the board and Chris downward rather than floating off into space*). A description of how the force of friction affects the motion of the skateboard is attempted but incorrect (*shoes of Chris are staying in place because of the griptape*). This addresses the friction between Chris and the skateboard rather than the friction between the skateboard and ramp that affects the motion of the skateboard as it travels down the ramp.

## Anchor Paper 8 – Score Point 2

(2) AB

3 points

Two forces that act on the skateboard are gravity and conductivity. Gravity effects the act on the skateboard because when Chris is riding down the ramp gravity is pulling the skateboard down. Conductivity effects the force of the skateboard because when Chris pushes his foot back and then puts it back on the board conductivity allowed him to move down the ramp.

Anchor Paper 8  
Score Point 2

The student identifies one force that acts on the skateboard (*gravity*) and incorrectly attempts to identify and explain "*conductivity*" as a force that acts on the motion of the skateboard as it moves down a ramp. The response explains how the force of gravity affects the motion of the skateboard (*gravity is pulling the skateboard down*).

**Anchor Paper 9 – Score Point 1**

① A9

3 points

The first force is Gravity the 2<sup>nd</sup>  
force is Friction

**Anchor Paper 9  
Score Point 1**

The student correctly identifies two forces that act on the skateboard (*Gravity, Friction*).

## Anchor Paper 10 – Score Point 1

① A10

3 points

Two forces that act on the skateboard as it moves down the ramp are

① Gravity acts on the board as it moves down the ramp.

② Friction also acts on the board as it moves down the ramp.

Anchor Paper 10  
Score Point 1

The student correctly identifies two forces that act on the skateboard, (*Gravity, Friction*). The response attempts to explain how gravity and friction affect the motion of the skateboard by stating “acts on the board as it moves down the ramp.” This statement does not explain how the motion is affected by gravity or friction, only that gravity and friction will act on the skateboard as it moves down the ramp.

## Anchor Paper 11 – Score Point 0

0 All

3 points

Two forces that act on the skateboard as it moves down the ramp is friction, conductivity.

Anchor Paper 11  
Score Point 0

The student correctly identifies one force that acts on the skateboard (*friction*) and gives a force that does not act on the motion of the skateboard, (*conductivity*). The student fails to provide explanations for the named forces.

## Anchor Paper 12 – Score Point 0

Q A12

3 points

The two forces that act on the skate board is when  
he rides down their is motion for him to ride slow. The other  
force is the sandpaper when you rub against it it makes  
it for you not to fall off when riding.

Anchor Paper 12  
Score Point 0

The student incorrectly identifies two forces (*motion, sandpaper*) and does not provide acceptable explanations of how these forces would affect the motion of the skateboard (*for him to ride slow....when you rub against it it makes it for you not to fall off when riding*).